Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] 1. A phase lock loop circuit, comprising:
a first charge pump circuit, a second charge pump circuit, and a loop filter circuit within the phase lock loop circuit, the loop filter circuit comprising a filter capacitor with a constant capacitance value, the first charge pump circuit being electrically connected to the loop filter, the first charge pump circuit being adapted to control a flow of current for the loop filter, the loop filter being adapted to provide a voltage for a voltage controlled oscillator, the second charge pump circuit being electrically connected to the loop filter circuit in parallel with the filter capacitor, and the first charge pump circuit and the second charge pump circuit being adapted to collectively vary an effective capacitance value of the filter capacitor.

[c2] 2. The phase lock loop circuit of claim 1, wherein the first charge pump circuit and the second charge pump circuit are further adapted to collectively vary a bandwidth of the phase lock loop circuit.

[c3] 3. The phase lock loop circuit of claim 1, wherein the first charge pump circuit and the second charge pump circuit are further adapted to collectively vary a damping

factor of the phase lock loop circuit.

[c4] 4. The phase lock loop circuit of claim 1, wherein the second charge pump circuit comprises an adjustable gain.

[c5] 5. The phase lock loop circuit of claim 4, wherein the first charge pump circuit comprises an adjustable gain.

[c6] 6. The phase lock loop circuit of claim 1, wherein the second charge pump circuit is adapted to source current to the filter capacitor.

[c7] 7. The phase lock loop circuit of claim 1, wherein the second charge pump circuit is adapted to sink current from the filter capacitor.

[c8] 8. The phase lock loop circuit of claim 1, wherein the first charge pump circuit and second charge pump circuit are further adapted to collectively reduce noise signals from an output signal of the phase lock loop circuit.

[c9] 9. The phase lock loop circuit of claim 1, wherein the effective capacitance value of the filter capacitor is dependent upon a gain of the first charge pump circuit, a gain of the second charge pump circuit, and the constant capacitance value of the filter capacitor.

[c10] 10. The phase lock loop circuit of claim 1, wherein the

first charge pump circuit and the second charge pump circuit are further adapted to collectively vary a bandwidth and a damping factor of the phase lock loop circuit simultaneously.

[c11] 11. The phase lock loop circuit of claim 1, wherein the first charge pump circuit is adapted to source current to the loop filter circuit.

[c12] 12. The phase lock loop circuit of claim 1, wherein the first charge pump circuit is adapted to sink current from the loop filter circuit.

[c13] 13. A method for optimizing a phase lock loop circuit, comprising:
providing a first charge pump circuit, a second charge pump circuit, and a loop filter circuit within the phase lock loop circuit, the loop filter circuit comprising a filter capacitor with a constant capacitance value, the first charge pump circuit being electrically connected to the loop filter, and the second charge pump circuit being electrically connected to the loop filter circuit in parallel with the filter capacitor;
controlling, by the first charge pump circuit, a flow of current for the loop filter;
varying, by the first the first charge pump circuit and the second charge pump circuit, an effective capacitance

value of the filter capacitor; and

providing, by the loop filter, a voltage for a voltage controlled oscillator.

[c14] 14. The method of claim 13, further comprising varying, by the first the first charge pump circuit and the second charge pump circuit, a bandwidth of the phase lock loop circuit.

[c15] 15. The method of claim 13, further comprising varying, by the first the first charge pump circuit and the second charge pump circuit, a damping factor of the phase lock loop circuit.

[c16] 16. The method of claim 13, further comprising varying, a gain of the second charge pump circuit.

[c17] 17. The method of claim 16, further comprising varying, a gain of the first charge pump circuit.

[c18] 18. The method of claim 13, further comprising sourcing, by the second charge pump circuit, a current flow to the filter capacitor.

[c19] 19. The method of claim 13, further comprising sinking, by the second charge pump circuit, a current flow from the filter capacitor.

[c20] 20. The method of claim 13, further comprising reduc-

ing, by the first the first charge pump circuit and the second charge pump circuit, noise signals from an output signal of the phase lock loop circuit.

[c21] 21. The method of claim 13, wherein the effective capacitance value of the filter capacitor is dependent upon a gain of the first charge pump circuit, a gain of the second charge pump circuit, and the constant capacitance value of the filter capacitor.

[c22] 22. The method of claim 13, further comprising varying, by the first charge pump circuit and the second charge pump circuit, a bandwidth and a damping factor of the phase lock loop circuit simultaneously.

[c23] 23. The method of claim 13, further comprising sourcing, by the first charge pump circuit, a current flow to the loop filter circuit.

[c24] 24. The method of claim 13, further comprising sinking, by the second charge pump circuit, a current flow from the loop filter circuit.